

PROMOTING ‘RELATIONAL EQUITY’ THROUGH A MATHEMATICS APPROACH FOCUSED UPON SOCIAL JUSTICE.

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Equity is a concept that is often measured in terms of test scores, with educators looking for equal test scores among students of different cultural groups, social classes or sexes. As an alternative I will discuss the idea of ‘relational equity’, a term I use to describe equitable relations in classrooms.

INTRODUCTION

In this paper I propose the term ‘relational equity’ to describe equitable relations in classrooms; relations that include students treating each other with respect and responsibility. This version of equity is close to Elizabeth Anderson’s notion (1999) of ‘democratic equity’. Anderson is a philosopher and her concern is not with test scores or other measures of educational achievement but with an individual’s standing in society. ‘Democratic equality is identified by an individual “standing as an equal over the course of an entire life”’ (Anderson 1999 p. 319). This conception is closest to the version of equity I propose as it concerns relations between people and it shifts the focus away from measures of achievement and onto ways of acting between people. In offering the term ‘relational equity’ I am proposing a different focus, no more or less important than the focus on achievement, that draws attention to the ways students learn to treat each other and the respect they learn for people from different circumstances to their own. There are many ways in which equitable relations may be encouraged and formed in classrooms; the version of relational equity that we observed in our study, had three important strands: Respect for other people’s ideas, leading to positive intellectual relations; Commitment to the learning of others; and Learned methods of communication and support.

THE STUDY.

The results in this paper draw from a 4-year study of different mathematics teaching approaches, following approximately 700 students over four years of different high schools (Boaler, 2008). Railside school was located next to the railway tracks in an urban setting in California. The students were from diverse ethnic and cultural groups and were largely from low-income homes. The other two schools in our study were called ‘Greendale’ and ‘Hilltop’ and they were in more suburban settings with less ethnic diversity. At Greendale and Hilltop the teachers taught mathematics traditionally - the teachers lectured and the students practiced methods, working their way through short questions. At Railside the teachers posed longer, conceptual problems; students worked in groups and they often presented their work while

teachers questioned presenters and other students. Greendale and Hilltop employed ability grouping and students were placed into one of three different levels of classes at the beginning of high school. At Railside all students were placed into heterogeneous algebra classes and teachers were completely committed to the belief that *all* students could achieve at the highest levels, even when they arrived at Railside with weak subject knowledge and understanding.

The students at Railside started high school at significantly lower mathematics levels than the students in the more suburban schools ($t = -9.141$, $p < 0.001$, $n = 658$), but within two years they were out-performing the other students scoring at significantly higher levels on mathematics tests ($t = -8.304$, $p < 0.001$, $n = 512$). By year 4 41% of Railside seniors were in advanced classes of pre-calculus or calculus compared to approximately 27% of seniors in the other two schools. In addition questionnaire and interview results each year showed that the Railside students were enjoying mathematics more than students at the other schools. Railside teachers were also extremely successful at reducing the achievement differences between groups of students belonging to different ethnic groups at the school.

RELATIONAL EQUITY

It was not possible to spend years in the classrooms at Railside without noticing that the students were learning to treat each other in more respectful ways than is typically seen in schools. In interviews with seniors at the end of high school they told us that the ethnic cliques that were evident in other schools did not form at their school because of the mathematics approach used at the school. The following analysis will report upon three particular characteristics that students learned and that I argue are important for the achievement of relational equity.

1. Commitment to the Learning of Others.

At Railside students were taught to be responsible for each other's learning. Many schools employ groupwork which, by its nature, brings with it an element of shared responsibility; but Railside teachers went beyond this to ensure that students took the responsibility very seriously. This had an important by-product, not only did the shared responsibility increase opportunities for students' learning of mathematics, as the teachers hoped, but it taught students to take responsibility for each other and to regard that responsibility as an important part of life. In previous research studies in England and the US I have interviewed many hundreds of students who have worked in groups (Boaler, 1997a). In virtually all cases students have reported that they prefer to work in groups than to work alone, but the students in all the other schools in which I have researched have listed benefits that were exclusively about their own learning. At Railside students also talked about the value groupwork added to their learning, but students' descriptions were distinctly reciprocal and they voiced a clear concern for the learning of their classmates. For example:

Int: do you prefer to work alone or in groups?

A: I think it'd be in groups, 'Cause I want, like people that doesn't know how to understand it I want to help them. And I want to, I want them to be good at it. And I want them to understand how to do the math that we do." (Amado, Railside, Y1)

The Railside students came to view each other more respectfully partly because the teachers worked hard to create classrooms in which learning was seen as a collective rather than an individual endeavour. This involved teaching students to be responsible for each other's learning, which they encouraged in different ways, including giving a constant message that students needed to stay together as a group. They also graded the discussions taking place in a group, and occasionally gave group tests in which students worked through a test together, but the teachers graded only one of the individual papers and that grade stood as the grade for all the students in the group. The students learned that mathematics was a collective phenomenon:

S: Math is really about group work 'cause you have like group tests and everything, so if you don't get it then you have to depend on your group a lot (Sue, Railside, Y4)

The actions of the teachers to change mathematics to a collective endeavour and to keep all students working together, even if some were able to move faster than others, is a contentious practice that many would regard as inappropriate. But our statistical analyses showed that the students who entered Railside at the highest levels attained more than the high attaining students at the other schools who worked in high ability groups. The students came to appreciate the diversity in their classes:

Everybody in there is at a different level. But what makes the class good is that everybody's at different levels so everybody's constantly teaching each other and helping each other out. (Zane, Railside, Y2)

RESPECT FOR OTHER PEOPLE'S IDEAS.

Another critical aspect of relational equity that emerged from our data was the respect that students learned for different ideas and viewpoints. This respect was particularly important because students came from diverse backgrounds and cultural groups. The students learned that different mathematical ideas were useful and they learned to value the different people giving such ideas. This helped the students to appreciate the diversity of people around them. For example, two students who told us they liked mathematics gave the following reasons:

T: You got everyone's perspective on it, 'cause like when you're debating it, a rule or a method you get someone else's perspective of what they think instead of just going off your own thoughts. That's why it was good with like a lot of people.

C: I liked it too. Most people opened up their ideas. (Tanita & Carol, Railside, Y4).

Many students talked about the ways they learned to have open minds and to respect different ways of thinking:

Int: what do you guys think it takes to be successful in math?

A: Being able to work with other people.

E: Be open minded, listen to everybody's ideas. (Ayana & Estelle, Railside, Y4)

Additionally, as students learned that different interpretations and perspectives on mathematics problems were important they also learned that different interpretations on issues and problems in life, were helpful. Richard Shweder (2003 p100) talks about the importance of considering different perspectives on issues in the working of a democratic society: 'It is often advantageous to have more than one discourse for interpreting a situation or solving a problem. Not only alternate solutions but multidimensional ones addressing "several orders of reality" or "orders of experience" may be more practical for solving complex human problems.'

Multidimensionality

At Railside the teachers created 'multidimensional' classes – classes in which they did not value only one way of working, as is often the case in math classes, but varied and multidimensional ones. When we asked students in traditional classes what it takes to be successful in mathematics, 97% of them named the exact same practice: "paying careful attention." When we interviewed the Railside students and asked the same question they offered many different practices such as: asking good questions, rephrasing problems, explaining well, being logical, justifying work, considering answers, and using manipulatives. The multidimensional nature of the classes at Railside was an important part of the increased success of students – *because there were more ways to be successful, many more students were successful.*

Learning methods of communication and support.

The third aspect of the equitable relations students achieved concerned the practical ways students learned to help each other, for it cannot be assumed that if students are placed into groups they will know how to support and help each other. At Railside, part of the reason for the success of the groups was the sophisticated forms of help the students developed. These ways of communicating and helping were modelled by the teachers in their careful and consistent interactions with students, and learned by students. One aspect of the communication students learned was the asking of good questions. Our analyses of the teachers' questions in the different approaches showed that the teachers at Railside asked more questions that were conceptual and probing, rather than procedural. Impressively the students learned to ask similar helpful questions of each other. The students also learned that it was helpful to question other students rather than simply *tell* other students how they had worked:

K: I think the biggest help is just to stop with the problem, stop doing it and kind of step back from it and start asking questions, start asking thought-provoking questions about the problem. (Jon, Railside, Y4)

The students also tried to motivate each other when some students appeared unmotivated. In interviews the students gave clear explanations of the ways they

would approach students who were not working and encourage them to get back on task, reflecting a supportive practice that we did not witness at the other schools. The different methods that students learned to help and motivate each other were both a source of their ultimate high achievement and an indication of the responsibility that they developed for their classmates.

DISCUSSION AND CONCLUSION.

The teachers at Railside school demonstrated the ways in which mixed ability grouping and an associated set of teaching practices encouraged students to interact positively with others from different social classes, cultural groups and ability levels and to broaden the ways they regarded other students, respecting the diverse ways in which different students approached mathematics work. The ethnic cliques that were evident in other schools in the area were not evident at Railside and the students attributed their productive relations with students across cultures to the mixed ability mathematics approach they experienced. Tim Brighouse recently summarized the 'great belief' uniting two of England's most influential school reformers, Brian Simon and Caroline Benn, in the following way: 'All children, however diverse, learn best when they learn together, sharing each other's insight and experience, absorbing knowledge and recreating knowledge as they collaborate, in the company of their teachers in a common pursuit' (Brighouse, 2003, 45,1,p3). Mathematics teachers rarely create the sort of collaborative classroom communities to which Brighouse alludes believing that mathematics is too hierarchical and closed to be the subject of collaboration and negotiation. The Railside teachers showed that mathematics is as open as any subject to the opportunities for students to learn powerful forms of communication, as well as respectful and positive intellectual relations.

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